

**Cal/EPA Environmental Management System Project
Report to the Legislature:
Executive Summary**

I. Background

The quest for a sustainable world began two decades ago with the work of the *United Nations World Commission on Environment and Development*. The Commission's report "Our Common Future", published in 1987, identified worldwide pressures and proposed actions that would foster sustainable development. Then in 1992, 172 nations participated in *The United Nations Conference on Environment and Development* in Rio de Janeiro, Brazil. Significantly, one result of the conference was the adoption of a comprehensive set of guidelines, Agenda 21, for achieving a sustainable global environment. Another result of the conference was the international business community's support for the development of standardized management systems for environmental protection. By 1996, the International Organization for Standardization (ISO) developed the "Standard for Environmental Management Systems", or ISO 14001 as it is most commonly called. From ISO 14001 has emerged an environmental management system (EMS) approach to managing and preventing pollution in regulated and non-regulated enterprises.

In 1998, the California Environmental Protection Agency (Cal/EPA) established an *Innovation Initiative* as a response to the growing international interest in achieving a sustainable global environment. It joined with U.S. EPA, non-governmental organizations (NGOs), business, academia and other states as a member of the Multi-State Working Group (MSWG) to study the environmental benefits of EMS as a tool for enhancing environmental protection and achieving sustainable development. The MSWG participants and observers presently include all 50 states, several of which are actively engaged in approximately 50 EMS pilot projects.

Because of the significant policy implications of the *Innovation Initiative*, the Legislature authorized the Cal/EPA to establish up to eight pilot projects with which to evaluate the potential of EMS in California. This executive summary describes the findings, conclusions, and recommendations resulting from the *Environmental Management System Project* (EMS Pilot Project) as prescribed in Assembly Bill 1102 (Stats. 1999, Ch. 65) codified in Public Resources Code (PRC), Section 71045 et seq. (AB 1102).

II. Pilot Project Goal

The EMS Pilot Project goal is to evaluate the EMS potential to achieve environmental results within and beyond the limitations of the existing regulatory system.

III. Pilot Project Objectives

The objectives of the EMS Pilot Project as specified by law are to evaluate:

1. Whether and how the use of an environmental management system (EMS) by a regulated entity increases public health and environmental protection over the present regulatory system and;

2. Whether and how the use of an EMS provides the public greater information on the nature and extent of public health and environmental effects than information provided by the present regulatory system.

To the above, Cal/EPA added the following objectives:

3. Evaluate economic indicators to determine incentives and barriers to EMS implementation.
4. Identify challenges and successful examples of EMS implementation.

Each of the pilot projects may identify additional project specific objectives that characterize unique aspects of a pilot's EMS.

IV. What is an EMS?

Stated simply, an environmental management system (EMS) is a management process designed to help an organization meet environmental objectives and achieve and demonstrate improved environmental performance. An EMS provides a systems framework for a process that includes a continuous cycle of planning, implementing, reviewing, and improving. The Plan-Do-Check-Act (or Adjust) cycle broadly outlines the systems approach of an EMS. The elements of an EMS include the environmental policy; aspects and impacts; objectives and targets; management programs; operational control; audits; management review; preventative and corrective action; communication networks; people and technology.

There are several models for EMSs; however, in 1996 the International Organization for Standardization (ISO) developed the "Standard for Environmental Management Systems", or ISO 14001 as it is most commonly called. ISO 14001 is a voluntary, global standard for environmental management systems. ISO means "equal" and represents the International Organization for Standardization, a non-governmental international organization based in Geneva, Switzerland. In the United States, organizations can elect to be certified (registered) to the ISO 14001 Standard by an independent auditor registered by the American National Standards Institute Registration Accreditation Board (ANSI RAB). It is important to understand that ISO 14001 certification is given to the *process* not the results. Process improvements are assumed to lead to better environmental performance results, such as improved compliance or the conservation of resources. This assumption is tested in the Cal/EPA EMS Pilot Project.

V. Project Design and Methodology

A multi-disciplinary team, administered through the Office of the Secretary, managed the EMS Pilot Project. Team members from the Air Resources Board, Department of Toxic Substances Control, Integrated Waste Management Board, and State Water Resources Control Board served as project managers for the pilot projects.

Phase I –Pilot Project Development

Phase I of the project consisted of identifying and soliciting stakeholders, including business, government and non-governmental organizations, to assist in the design of

the project, the criteria by which pilots would be selected, data collection protocols, and Pilot Project Work Plans. Two Working Groups, one in Northern California and one in Southern California, were established in 1999. Also, Local Working Groups for individual pilot projects were encouraged. Several workshops were conducted to involve stakeholders directly in the development of pilot project selection criteria, Pilot Project Work Plans, and Evaluation and Monitoring Parameters (data collection protocols).¹ Two public hearings were conducted in May 2000 and the following seven pilot projects were selected.

- Anheuser-Busch Brewery, Fairfield (A-BI)
- Two publicly owned wastewater treatment facilities: Central Marin Sanitation Agency in San Rafael (CMSA); San Diego Metropolitan Wastewater Department, Operations and Maintenance Division, San Diego (San Diego)
- IBM Corporation, San Jose (IBM)
- Lockheed Martin Aeronautics Company, Palmdale (LM Aero - Palmdale)
- Two metal finishing facilities: Artistic Plating, Anaheim (Artistic); Gene's Plating, Los Angeles (later removed from the project)
- Pentel of America, Ltd., Torrance (Pentel)
- Two Sonoma County wineries: Davis Bynum Winery; Benziger Family Winery (wineries)

Phase II – Data Collection, EMS Education

The second phase of the pilot project involved collecting data on EMS implementation from pilot projects using the Evaluation and Monitoring Parameters as well as facility visits. A series of four educational workshops given in both Northern and Southern California and funded by a US EPA grant were developed to provide a basic understanding of EMSs for all stakeholders. Developing a common understanding was a critical prerequisite to evaluating data and establishing the conclusions of the EMS project.

Evaluation and Monitoring Parameters selected for the EMS Project consist of the National Database on Environmental Management Systems Data Protocols (National Database) and the Supplemental California Protocols. The National Database was developed by the Multi-State Working Group on EMS and funded by the US EPA.

Phase III – Data Analysis

The final phase of the EMS Project involved an analysis of the data and establishing the conclusions of the project. The evaluation of each pilot project is described in pilot study reports (Appendices A through H). Data analysis is conducted based on a specified methodology and supports determinations as to whether and how the use of an EMS:

¹ Evaluation and Monitoring Parameters and Working Group meeting minutes are available at www.calepa.ca.gov/EMS.

- Increases public health and environmental protection² beyond that required by law and regulation; and
- Provides the public with greater environmental information than required by law and regulation.

To determine whether and how improved environmental protection resulted from EMS implementation, Cal/EPA evaluated three primary categories of information from each pilot project, these being improvements in: 1) awareness and commitment; 2) systematic management of environmental impacts; and 3) performance for key environmental indicators.

The provision of greater environmental information was measured by evaluating the type, relevance, and accessibility of the information. The level of involvement the receiving audience has in the information's creation can also indicate greater information. Therefore Cal/EPA analyzed: 1) public access to information about the EMS, environmental impacts and environmental performance; and 2) public and stakeholder involvement in EMS development, implementation and review.

Pilot study analysis also supports the formation of findings and conclusions related to economic impacts of EMS implementation, challenges and successes in EMS implementation, and any specific objectives identified in the individual Pilot Project Work Plans.

VI. Project Description Summaries

The Legislative Report includes summaries of each pilot project. Pilot study Reports are included in Appendices A through H.

VII. Findings

This section provides findings based on the results and analysis of the individual EMS pilot projects, separated into four categories. The first two categories address the main objectives of the Cal/EPA EMS Project and are related to improved environmental protection and greater public information. A third category addresses economic findings. The final category addresses lessons learned including challenges to and successes of EMS implementation.

A. Findings related to whether and how an EMS increases public health and environmental protection beyond that required by law and regulation.

Significant improvements in environmental protection were observed in most of the pilot projects. Pilots demonstrated increased awareness of their environmental impacts and responsibilities through aspect and impact assessment and through the identification of legal and other requirements. Their Environmental Policies and objectives and targets established greater commitments to environmental protection than was observed prior to EMS implementation. These changes established a basis for further system changes and improved performance.

² This report and the pilot study reports use the term environmental protection to mean both environmental and public health protection.

Improved systems for managing environmental impacts were observed in many of the pilot projects. System elements that were found to improve environmental protection include increased monitoring and measurement, operational controls, communication, training and job responsibilities. Systems for compliance assurance included some or all of the following elements: improved monitoring, internal and external audits, management review, root cause analysis, corrective action, and preventive action. Pilot projects with mature EMSs created systems for continual improvement that included performance measurement, internal and external audits, management review, corrective action, and new objective setting. Information technology played an important role in implementing, maintaining, and improving EMSs at the larger facilities with mature EMSs.

Some improvement in environmental performance was observed at all pilots reporting performance data. The range of improvement, however, varied between pilots, with some reporting significant change (Artistic, LM Aero, Pentel, and San Diego) while others reported only moderate gains (A-BI and IBM). The vast majority of performance improvements were observed in non-regulated areas. With the exception of pollution prevention goals for hazardous waste and toxic releases, objectives and targets were more likely set for non-regulated media.

Barriers or thresholds to environmental performance were observed in many pilot projects. In some cases, regulatory emission limits acted as a limit to improved environmental performance.

Compliance improvements were difficult to observe, as measured by violations; however, many pilots had a better recognition of and response to compliance issues. In some cases, pilots who had no violations before the EMS was put in place, such as IBM, continued to have no violations afterwards. In other cases, pilots who had violations before the EMS, such as Artistic, had some violations after the EMS was put in place, but had better systems in place to respond to problems swiftly.

B. Findings related to whether and how an EMS provides greater environmental information to the public than that required by law and regulation.

New and useful environmental information can be created through the implementation of EMSs. This includes environmental policies, lists of significant impacts, objectives for improvement, and performance indicators. With the exception of some performance indicators, laws and regulations do not require this information be created. However, EMS implementation did not result in great improvements in the availability and access of environmental information to the general public. Pilot projects willingly shared EMS information within the Cal/EPA sponsored Working Groups. Most pilots only make this same information available to the general public upon request.

The level of stakeholder involvement is another measure of improved information. Direct government involvement through the Merit Partnership and Strategic Goals Program improved the quality of the metal finishing EMS by helping to identify impacts and set meaningful objectives and targets. Cal/EPA's involvement in the development of the wineries' EMS also influenced their development. Local stakeholder groups were present at three pilots (CMSA, Wineries, and LM Aero – Palmdale). More focused stakeholder participation and input into EMSs occurred in Local Working Groups as compared to the Regional Working Groups.

C. Economic Indicators

Only two pilot projects reported economic data. As a result of environmental improvements in its manufacturing processes, Artistic Plating is projected to realize a \$1,028,960 saving over a 10-year period. LM Aero – Palmdale has reduced its annual environmental costs by over \$1 million (or 54%) between 1992 and 1999. Total cost savings during that period equal \$7,249,000. Although economic data may not be generally available, several pilots reported cost savings as a result of EMS implementation (Pentel, San Diego, IBM, and A-BI).

D. Challenges to and Successes of EMS implementation

The presence of a champion and senior management support were seen as critical to successful EMS implementation. When these conditions were not present, pilots experienced difficulty implementing their EMS.

EMS implementation can be especially challenging to small and medium sized enterprises (SMEs). One challenge is the significant economic and human resources needed to develop, implement and maintain an EMS. Because of the many changing responsibilities of employees and management at an SME, maintaining focus and momentum can be challenging. The technical complexity of an EMS is another challenge. Technical assistance from government helped overcome economic and technical barriers to EMS implementation at the pilots considered SMEs.

The pilot projects also demonstrated examples of successful EMS implementation. Pilots with fully implemented EMSs, like LM Aero – Palmdale, IBM, A-BI, Pentel and San Diego were able to successfully connect the different elements of their EMS into a consistent and integrated system. Pilots with mature EMSs were also able to integrate their EMSs into the various aspects of their business including design, production, and purchasing. On the contrary, pilots with EMSs still in development or partially implemented (CMSA, Wineries) have not been able to thoroughly connect various elements of their EMS. Limited performance improvements were observed at these pilots.

VIII. Analysis

The analysis section is based on the findings of the pilot project and provides a synthesis of that information in order to understand how an EMS can provide improved environmental protection.

The Value of a Systems Approach

EMS implementation can have a positive effect on environmental protection including improved systems for environmental compliance. The systems approach to environmental management used in an EMS is key to this success. The Plan-Do-Check-Act (or Adjust) cycle broadly outlines the systems approach of an EMS. This cycle establishes a feedback loop that helps drive continual improvement in environmental protection.

Factors That Affect the Quality of an EMS

A range of environmental performance outcomes, or protection improvements, was observed in the EMS pilot projects. Cal/EPA observed several factors that either act to inhibit or promote successful EMS implementation as measured by the resulting improvements in environmental protection. For example, promoters include a strong management commitment to EMS implementation and improved environmental protection, as well as the presence of champions in either management or staff. Inhibitors include a lack of financial or personnel resources to develop and implement an EMS. (See Table 5 for more examples.)

Improvements in Environmental Protection

Theoretically, improvement in environmental protection can be graphically represented by an ‘S’ curve. During the early stages of EMS development and implementation, an organization must overcome challenges that act to inhibit the system’s development and impact the resulting level of environmental protection. As these challenges are overcome and the system is implemented, environmental protection advances. Improvements will continue until barriers for continued improvement, or thresholds of the system are reached. Once a threshold is reached three scenarios are possible. Performance stagnates, breaks through the barrier and continues to improve, or backslides.

IX. Conclusions

1. EMSs Can Have a Positive Impact on Environmental Protection

Most pilot projects improved environmental protection in areas of significant environmental impact that are not addressed by regulation or law. Very few pilots, on the other hand, outperformed legally mandated performance levels, such as discharge limits, as a result of EMS implementation. However, EMSs were responsible for improved compliance with regulatory standards at pilots such as LM Aero - Palmdale and Pentel.

2. A Systems Approach Towards Environmental Management Yields Results

Part of the primary objective of the EMS Pilot Project was to determine how an EMS improves environmental protection. EMSs can improve environmental protection at an organization by taking a Systems Approach. Critical to the operation of a system and the achievement of goals is the movement of information through feedback loops. Feedback and corrective action can result in the continual improvement of environmental protection.

3. Organizations May be Reluctant to Set Objectives and Targets that Exceed Regulatory Standards

Quantitative regulatory emission, discharge, and reporting standards can act as a ceiling for environmental performance if an organization is not motivated to perform beyond regulatory requirements by other benefits, economic or civic.

4. Economic Benefits May Motivate Improvements in Non-Regulated Activities

Although limited economic information was collected in the EMS Pilot Project, economic benefits were reported from the conservation of electricity and water and the reduction of solid and hazardous waste disposed.

5. Better Understanding of EMS is Needed at All Levels of Government

Since environmental performance can be enhanced through the use of EMSs, government at all levels will need to understand EMSs and their use as a tool to better environmental performance.

6. Government Support of EMSs Could Improve Environmental Protection

Government can support EMS development and improve environmental protection by providing tools such as templates or implementation guides; providing grants; establishing partnerships; establishing performance goals; providing rewards (such as public recognition) for outstanding organizations; providing resources; and supporting EMS development for Supplemental Environmental Projects in enforcement cases.

7. EMSs Generate New and Useful Environmental Information

The systems approach to environmental management found in EMSs generates new and useful information. Information flow acts as a feedback loop allowing the system to adjust in order to stay consistent with the environmental policy and meet objectives. The types of information created by an EMS include: environmental policy; significant environmental aspects and impacts; objectives and targets; performance metrics; programs and procedures; audit results; and preventative and corrective actions.

8. Potential for Improved Sharing of Environmental Information with the General Public not yet Realized.

Environmental information generated by a pilot's EMS is usually organized in ways that make the information relevant and accessible. However, this information is generally used for internal purposes, or made available to the public only on request. With the exception of the Cal/EPA sponsored stakeholder Working Groups, environmental performance information generated by the pilots was not usually shared with the general public. Several pilot projects use the Internet to provide the public with some environmental information, such as environmental policies.

9. EMS Information May Be Useful to External Parties and Help Improve Environmental Protection by Creating External Feedback Loops

The type of information generated by EMSs may be valuable to both environmental agencies and communities. Communities or non-governmental organizations could use the information to track environmental issues important to them and provide feedback to both regulatory agencies and to the organization with the EMS. Therefore, EMSs have the potential of establishing performance enhancing communication systems between industry, communities, and government.

10. Small and Medium Sized Enterprises (SMEs) May be Especially Challenged in Implementing EMSs

For a small or medium sized enterprise, there are many barriers to successful EMS implementation. These companies may face personnel and economic challenges in EMS implementation that are not issues for larger companies. SMEs may require assistance in overcoming barriers. Large, sophisticated organization could play a role in mentoring smaller organizations.

11. EMS Require a Foundation of Enforceable Standards

EMSs should not be viewed as an alternative or a replacement for the current command and control regulatory system. Enforceable standards are essential to environmental protection in California because they set the minimum level of performance. EMSs provide a new tool that can help ensure greater adherence to regulatory standards as well as protection beyond legal mandates and in areas outside regulatory protection.

X. Recommendations

1. Establish and Nurture a Culture of Innovation and Experimentation within Cal/EPA

Cal/EPA can help to institutionalize the use of cross-media, multiple tool approaches to address persistent California-specific environmental problems. This can be accomplished through specific projects implemented through partnerships involving state, local, and federal agencies as well as industry representative and the non-government public interest sector.

Through implementing its own EMS, Cal/EPA can also learn about EMSs and set an example for others. This first hand experience with EMS implementation will help Cal/EPA understand the application of an EMS more thoroughly, and learn how it applies to a regulating agency.

Also, Cal/EPA can develop emerging leaders by informing and educating Cal/EPA management and professional staff about the range of policy, management, and technology tools available for environmental problem solving. This approach can help federal, state, and local governments develop the leadership ability to institutionalize more protective environmental and resource management policies and practices through education and practical application.

2. Government can set targets to increase environmental performance.

Environmental performance targets can establish sector, regional or statewide goals for greater environmental protection. Whether voluntary or legislatively mandated, targets can help spur performance improvement. Stakeholder partnerships might establish targets for a sector or region and then assist in providing the tools necessary for meeting those targets. Assistance could be in the form of EMS templates or other innovative technologies.

3. Government can support environmental information sharing with the public and recognize efforts to share information

EMSs provide an excellent structure for gathering information. Government can help make environmental information available to the public, such as information on environmental

impacts, targets for improvement, and progress towards goals. Improved information sharing could be one criterion for public recognition of environmental efforts.

Government could explore developing a reporting approach for organizations with EMSs, which meet multiple agency requirements in a consolidated fashion. In this way, government may request more environmental performance data, recognize accomplishments, and make reporting requirements more efficient.

4. Establish a Regulatory Track for High Environmental Performers

In order to maintain and increase environmental protection for the highest environmental performing organizations, a separate regulatory track should be created. In exchange for strict environmental compliance, superior environmental performance and increased public reporting, advanced legal relationships between the regulated and regulating agencies can be established. This, new approach could include facility wide permits, longer permit life, and more meaningful and modern reporting requirements.

5. Implement EMSs with Key Elements

For an organization to successfully implement systems based management of the environment, key elements must be present. Based on the information collected in the pilot project, Cal/EPA recommends the following key elements:

- An environmental policy with commitments to pollution prevention, resource conservation, compliance, public involvement and continual improvement;
- Whole system assessment of environmental impacts and identification of those which are most significant;
- Objective setting for the reduction of environmental impacts;
- Measuring and monitoring of practices and performance which support environmental policy and objectives;
- Operational controls;
- Audits (internal and third party);
- Management review and adjustments in the system to ensure continual improvement;
- Involvement of effective stakeholders; and
- Public reporting of performance results.